
शर्करा उद्योग के लिए
गन्ना क्रशिंग रोलर्स — विशिष्टि
(पहला पुनरीक्षण)

**Cane Crushing Rollers for
Sugar Industry — Specification**
(*First Revision*)

ICS 65.060

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Sugar Industry Sectional Committee had been approved by the Food and Agriculture Division Council.

This standard was originally published in 1985. The first revision of this standard has been undertaken to align it with the latest practices in the sugar industry.

In this standard, additional requirement of a fillet radius of minimum 25 mm between the journal and the shaft has been provided. And, manganese 2.2 to 2.6 percent in shell has been specified in the composition of shell.

The composition of the Committee responsible for the formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off of numerals' (*revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CANE CRUSHING ROLLERS FOR SUGAR INDUSTRY — SPECIFICATION

(First Revision)

1 SCOPE

This Indian Standard specifies physical properties and technical requirement of shell and shaft materials, method of construction, recommended tolerances and various tests for the cane crushing rollers for sugar factories.

2 REFERENCES

The standards listed below contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No</i>	<i>Title</i>
IS1570 (Part 2) : 1979	Schedules for wrought steels: Part 2 Carbon steel (unalloyed steels) (<i>first revision</i>)
IS 3658 : 1999	Code of practice for liquid penetrant flaw detection steel forgings (<i>second revision</i>)
IS 7743 : 2006	Recommended practice for magnetic particle testing and inspection of steel forgings (<i>first revision</i>)
IS 7754 : 1975	Method of designation of the micro-structure of graphite in cast iron
IS 8791 : 1978	Code of practice for ultrasonic flaw detection of ferrite

3 TERMINOLOGY

The various terms relating to sugar mill rollers used in this standard are as follows (*see* Fig. 1).

3.1 Shaft

A round forged and machined steel bar on which cast iron shell is fitted.

3.2 Shell Seat

The long straight portion of shaft on which the shell is fitted.

3.3 Roller Journal

The polished surface at both ends of shell seat on which bearings are fitted.

3.4 Pintle End

The shaft end having a key way for sprocket fitting is known as pintle end.

3.5 Square End

The shaft end on which pinion and couplings are fitted.

3.6 Shell

A hollow cast iron round which is shrunk fitted on the shaft.

3.7 Flange Fixing Holes

These holes are drilled and tapped at both ends of the shell of the top roller to facilitate fitting of steel flanges. The number and size of these holes vary according to different shell sizes and design.

3.8 Keeper and Guard Rings

These rings are made of mild steel and are shrunk fitted on both ends of the shell to safeguard against shifting

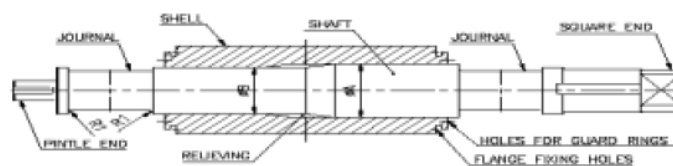


FIG. 1 SUGAR MILL ROLLER SHELL

of shell towards either end during working and also to avoid entering of juice into the shell. Holes are drilled and tapped on the keeper rings of bottom rollers to fit the juice rings which prevent entering of juice in the bottom roller bearings. The height of this juice ring should not be less than 50 mm.

4 MATERIAL

The sugar-mill rollers shall consist of a forged steel shaft and a cast iron shell.

4.1 Shaft

The shaft for sugar mill roller shall be made out of forged, normalized steel conforming to the grade 35C8 (35Mn75) or 40C8 (C40) of IS1570 (Part 2) : 1979 'Schedules for wrought steels: Part 2 Carbon steel (unalloyed steels) (first revision)', and having a minimum tensile strength of 48 to 58 kg/mm and elongation 20 percent. Wherever steps diameter is there, taper shall be provided to both shaft and shell.

4.1.1 A fillet radius of minimum 25 mm between the journal and the shaft shall be provided.

4.1.2 The shafts shall be ultrasonically tested as given in IS 8791 : 1978 'Code of practice for ultrasonic flaw detection of ferrite steel forgings'. To have a thorough examination of the entire surface of the shaft, surface/sub-surface defects shall also be detected by dye penetration test as given in IS 3658 : 1999 'Code of practice for liquid penetrant flaw detection (second revision)' or magnetic particle inspection as given in IS 7743 : 2006 'Recommended practice for magnetic particle testing and inspection of steel forgings' and also as explained in Fig. 2.

Note — Since the shafts are required to transmit heavy torques, they are subjected to cyclic stresses. Therefore, stress relieving of the shafts should be done after every 1 000 0 crushing h.

4.2 Shell

The shell shall be made out of coarse-grain iron and the microscopic structure shall conform to type 'A'

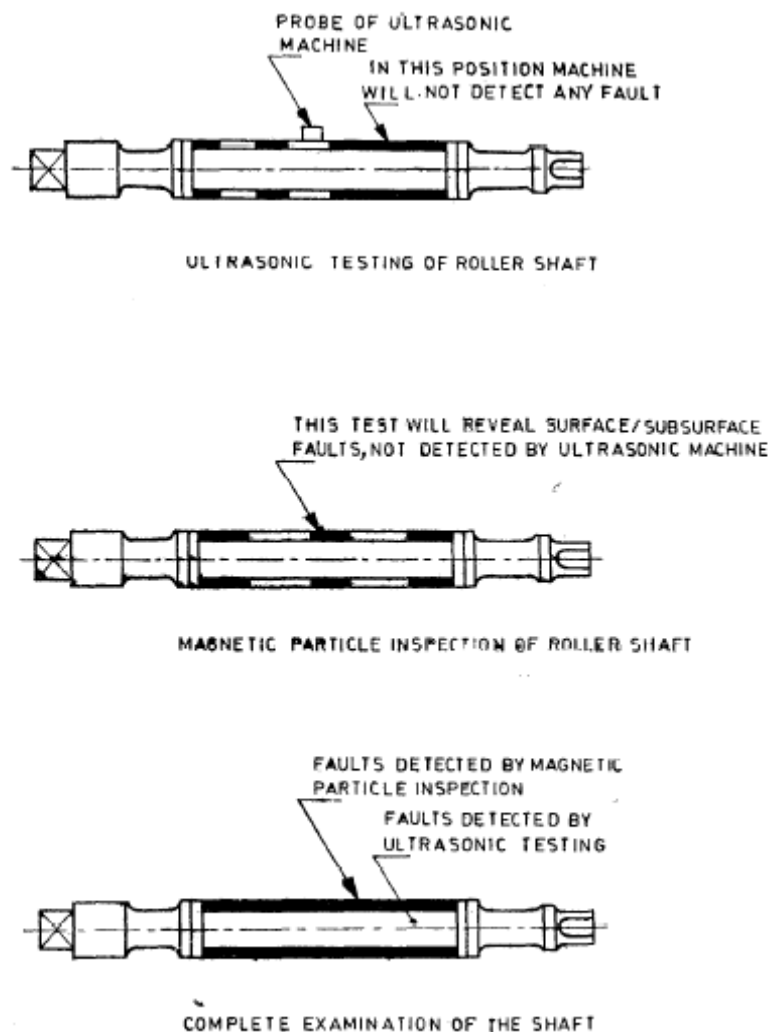


FIG. 2 ULTRASONIC AND MAGNETIC PARTICLE INSPECTION OF ROLLER SHAFT

distribution of graphite flakes in grey iron, as given in IS 7754 : 1975 'Method of designation of the micro-structure of graphite in cast iron', as characterised by uniform distribution and random orientation at 100 magnification.

4.2.1 The shell shall have the following composition:

Total carbon	3.2 to 3.6 percent
Sulphur	0.15 percent, <i>Max</i>
Phosphorus	0.5 percent, <i>Max</i>
Manganese	2.2 to 2.6 percent
Silicon	1.2 to 2.2 percent

4.2.2 To have less wear and tear of the surface, the hardness of the shell casting shall be maintained within the range of 180 - 210 BHN, as tested by 'Poldi' hardness testing method.

5 SHRINKING

The shell shall be shrunk fit on the shaft throughout its length, with a relieving bore (taper) of 100 - 200 mm length and 2 mm height at the centre for easy shrink fitting. For sound gripping, the shrinkage allowance shall range between 0.07 and 0.10 mm per 100 mm shaft diameter.

6 WORKMANSHIP AND FINISH

6.1 The shaft and shell shall be machined properly.

6.2 The shaft and shell shall be free from holes, cracks, seams or other visual defects.

7 MARKING

7.1 Each roller shall be marked with the following particulars:

- a) Manufacturer's name or recognized trade-mark,
- b) Size (diameter and length), and
- c) Code or batch number.

7.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

7.2.1 The use of Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made thereunder. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8 PACKING

As agreed to between the purchaser and the supplier.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Sugar Industry Sectional Committee, FAD 02

<i>Organization</i>	<i>Representative(s)</i>
National Sugar Insititure, Kanpur	SHRI NARENDRA MOHAN (Chairman) SHRI ASHUTOSH BAJPAI (<i>Alternate</i>)
Army Service Core (ASC), New Delhi	LT COL B. B. SAHU
CONCERT, Chennai	SHRI R. SANTHANAM SHRI M. SOMASUNDARAM (<i>Alternate</i>)
Consumer Guidance Society of India, Mumbai	SHRI SITARAM DIXIT DR M. S. KAMAT (<i>Alternate</i>)
Food Corporation of India, New Delhi	SHRI DEEPAK KUMAR PANWAR SHRI RAKESH KUMAR RANJAN (<i>Alternate</i>)
Food Safety Standards Authority of India, New Delhi	Ms APOORVA SRIVASTAVA (TECHNICAL OFFICER)
Global Cane Sugar Ltd, New Delhi	DR G. S. C. RAO MR ANIL SRIVASTAVA (<i>Alternate</i>)
Indian Institute of Sugarcane Research, Lucknow	DR A. D. PATHAK DR A. K. SHARMA (<i>Alternate</i>)
Indian Institute of Toxicology Research, Lucknow	DR YOGESHWER SHUKLA
Indian Sugar Mills Association , New Delhi	SHRI G. K. THAKUR SHRI PANKAJ RASTOGI (<i>Alternate</i>)
Indian Sugar Exim Corporation, New Delhi	MR RAJIV AGGARWAL MR RAJEEV KURUP (<i>Alternate</i>)
Ministry of Consumer Affairs, Food & Public Distribution, New Delhi	SHRI SURESH CHANDRA
National Co-operative Development Corporation, New Delhi	SHRI K. P. VAISH SHRI N. K. SHARDA (<i>Alternate</i>)
National Fed. Of Co-operative Development Corporation, New Delhi	MR MANOHAR GOPAL JOSHI
The Sugar Technologists Association of India, New Delhi	SHRI SANJAY AWASTHI SHRI ANURAG GOYAL (<i>Alternate</i>)
Triveni Engineering & Industries Ltd, Muzaffarnagar, UP	RAJESH SINGH P. K. KHADELWAL (<i>Alternate</i>)
BIS Directorate General	SHRI P. RAJESH , SCIENTIST 'E' AND HEAD (FAD) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary

SHRI RAJPAL
SCIENTIST 'C', BIS

Panel on Template, FAD 02/Panel (Engineering Standards)

<i>Organization</i>	<i>Representative(s)</i>
NSL Sugar, Hyderabad	SHRI T. S. REDDY, CHIEF OPERATING OFFICER (Convever)
Chairman, Shrijee Engineering Works, Mumbai	SHRI G. D. AGARWAL
Dalmia Sugars Ltd	SHRI NEERAJ BANSAL
Global Sugar cane Ltd, New Delhi	SHRI MUKE SHRI CHOUHAN
Indian Sugar Mills Association, New Delhi	SHRI PANKAJ RASTOGI
JPMA-Pune	SHRI M. S. SUNDRAM
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VSI, Pune	SHRI K. R. PATIL

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Amendments Issued Since Publication

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